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Quasi-Static Study on Tall Building based on Measured Dynamic Wind Pressure

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ABSTRACT : *One issue that dominates the serviceability design of many modern tall buildings is wind-induced discomfort. The assessment of discomfort risk for the buildings occupants due to the wind action is, therefore, of primary importance. The treatment of wind loading, which is universally applied to design of typical low to medium-rise structures, can be unacceptably conservative for design of very tall buildings.*

This study presents the experimental results of evaluate wind pressure distributions on all four faces of a rectangular tall building with 1:1.5:7 ratio. The model is made up of acrylic sheet with a geometric scale of 1:300 with plan dimension of 10 cm x 15 cm and height of 70 cm. The model is instrumented with 192 numbers of pressure taps at eight different levels were denoted as Level 1, Level 2, Level 3, Level 4, Level 5 Level 6, level 7 and level 8 corresponding to the heights of z/H ratio (where H is height of the model) are 0.10, 0.20, 0.30, 0.50, 0.70, 0.80, 0.90 and 0.95 respectively. The model is tested using a Boundary Layer Wind Tunnel (BLWT) facility at CSIR-SERC, Chennai for twelve angles (0°, 5°, 10°, 15°, 25°, 33.5°, 45°, 56.5°, 60°, 75°, 87.5° & 90°) of wind incidence under plain terrain condition.

The measured pressure data have been integrated to evaluate mean pressure coefficients, drag & lift coefficients along wind direction and perpendicular to wind direction, mean moment coefficients at each of measured levels. The mean pressure coefficient values on the wind ward face are almost comparable at all levels, while on the leeward face and side faces the lower levels have a minimum values compared to higher levels. Mean force coefficients for level 8 are always higher than all the other levels due to edge effect at top levels. The mean drag coefficient values are gives a good agreement with codal values (IS: 875 (Part 3)-1987).